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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |  |  |
|--|-------------|----------------------|---------------------|------------------|--|--|
| 10/599,816   | 06/13/2007  | Soon Mo Hwang        | 5025-0008           | 5120             |  |  |
| 22429  | 7590        | 06/10/2009           | EXAMINER            |                  |  |  |
| LOWE HAUPTMAN HAM & BERNER, LLP<br>1700 DIAGONAL ROAD<br>SUITE 300<br>ALEXANDRIA, VA 22314 |             |                      |                     | LAUX, DAVID J    |  |  |
| ART UNIT   |             | PAPER NUMBER         |                     |                  |  |  |
| 3743   |             |                      |                     |                  |  |  |
| MAIL DATE  |             | DELIVERY MODE        |                     |                  |  |  |
| 06/10/2009   |             | PAPER                |                     |                  |  |  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/599,816             | HWANG ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | David J. Laux          | 3743                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 25 March 2009.

2a) This action is **FINAL**.                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-8 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 10 October 2006 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.

5) Notice of Informal Patent Application

6) Other: \_\_\_\_\_.

## DETAILED ACTION

This action is in response to applicant's submission dated 03/25/2009. Claim(s) 1-8 is/are pending.

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

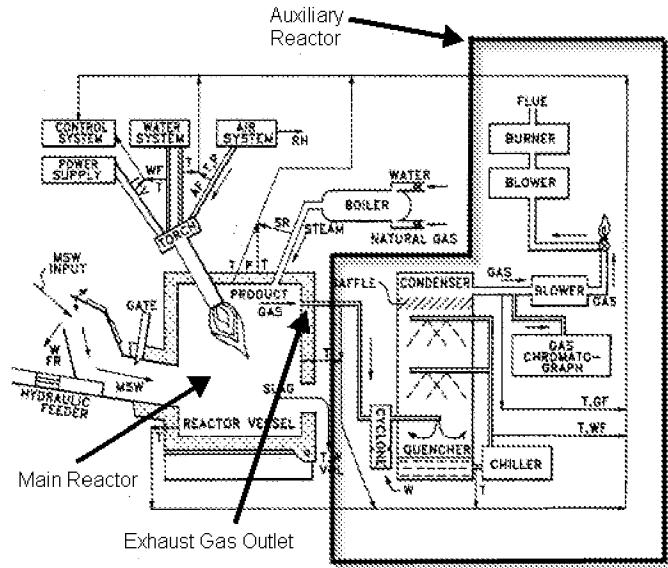
3. Claims 1-5 & 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,155,182 to Tsangaris et al in view of US 5,280,757 to Carter et al and further in view of US 3,357,383 to Golovanov et al.

4. '182 discloses a cyclonic plasma pyrolysis/vitrification system comprising: a main reactor (11) having a waste inlet (13-16) supplying waste materials (Col. 6, lines 48-62), an exhaust gas outlet (20a) for discharging exhaust gas (Col. 7, lines 9-10), and a slag outlet (20) for discharging slag (Col. 7, lines 5-9); a plasma torch (12) inclined at a predetermined angle with respect to the internal bottom surface of the main reactor (Fig. 1A depicts the plasma torch being at an angle with respect to the reactor bottom); a slag discharger (18), connected to the slag outlet (20) of the main reactor (11) for discharging the slag (Fig. 1A; slag discharger is connected to the slag outlet, the slag

outlet discharging the slag from the reactor); wherein the plasma torch (12) circulates the gas in the main reactor (11) (a plasma torch circulates gas, said gas being in the main reactor), causing the flyash to melt and to be absorbed into molten waste materials on both inner walls and the bottom surface of the main reactor (11) (Col. 7, lines 13; because the reaction chamber is gas-tight, flyash in the rotating gases would come into contact with the refractory walls of the reaction chamber or the molten pool of slag on the reaction chamber floor where the particles would melt (in the case where the particles touched the refractory walls) or be absorbed (in the case where the particles touched the molten slag pool)).

5. ‘182 fails to disclose to induce a cyclonic gas flow which rotates about an essentially horizontal axis above the bottom surface of the main reactor for pyrolyzing and vitrifying the waste materials in the main reactor and subjects flyashes contained in the circulating exhaust gas to centrifugal force. ‘383 teaches the induction of a cyclonic gas flow which rotates about an essentially horizontal axis above the bottom surface of the main reactor for combusting the waste materials in the main reactor (Col. 1, lines 14-22) and subjects flyashes contained in the circulating exhaust gas to centrifugal force (Col. 2, lines 39-47). It would have been obvious for one skilled in the art at the time of invention to combine the plasma reactor of ‘182 with the cyclonic gas flow of ‘383 because such a combination would have produced the added benefit of a well-mixed pyrolytic flow of gases that ensured the slag particles were adequately heated to allow them to melt along the reactor walls and collect in the molten slag pool, which reduces the amount of solid slag particles in the flue gases.

6. '182 fails to disclose an auxiliary reactor connected to the exhaust gas outlet of the main reactor, for discharging the exhaust gas or a gas burner arranged with the plasma torch to direct a flame into the main reactor in manner to promote heating of the main reactor. '757 teaches a plasma reactor with an auxiliary reactor connected to the exhaust gas outlet of the main reactor, for discharging the exhaust gas (see Fig. 1 reproduced below) and a gas burner arranged with the plasma torch to direct a flame into the main reactor in manner to promote heating of the main reactor (Col. 4, lines 14-17). It would have been obvious for one skilled in the art at the time of invention to combine the plasma reactor of '182 with the auxiliary treatment reactor of '757 because such a combination would have produced the added benefit of and exhaust gas with reduced heat and particle emissions to allow the gas to be more easily handled and used as a syngas. It would further have been obvious for one skilled in the art at the time of invention to combine the plasma reactor of '182 with the auxiliary burner of '757 because such a combination would have produced the added benefit of a means to preheat the waste and increase the temperature of the reactor vessel to ensure the plasma torch is able to fully vitrify and pyrolysize the waste.



7. With regard to claim 2, '182 further discloses the slag discharger (18) being formed just under the plasma torch (12) (Fig. 1A).

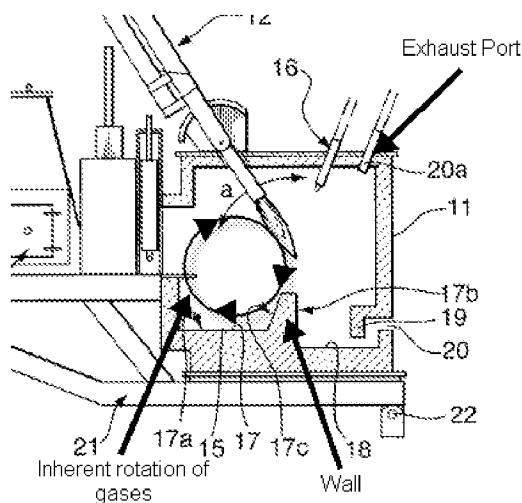
8. With regard to claim 3, '182 further discloses a waste inlet (15) located in a side wall of the main reactor (11) and located to deliver waste material essentially horizontally into the cyclonic gas flow (Fig. 1A), and wherein the exhaust gas outlet (20a) opens into the main reactor (11) a designated distance from the waste inlet (15) (Fig. 1A; exhaust outlet is some distance from waste inlet), and wherein the main reactor (11) has a downwardly extending separator wall (17 b&c) of designated length formed therein (Fig. 1A).

9. With regard to claim 4, '182 as combined with '757 discloses the claimed invention except for the exhaust gas outlet being disposed so as to correspond essentially with the axis of the cyclonic gas flow and essentially a center of an inner wall of the main reactor. '383 further teaches the exhaust gas outlet being disposed so as to correspond essentially with the axis of the cyclonic gas flow and essentially a

center of an inner wall of the main reactor (Col. 1, lines 21-22). It would have been obvious for one skilled in the art at the time of invention to combine the plasma reactor of '182 with the axial gas outlet of '383 because such a combination would have produced the added benefit of an exhaust gas entrained with fewer slag particles as the centrifugal forces throw the slag particles to the outside leaving only the flue gases to exit through the flue gas outlet.

10. With regard to claim 5, '182 further discloses the plasma torch inclined at an angle of about 30 degrees with respect to the bottom surface of the main reactor (Fig. 1A), the plasma torch angle being adjustable to encompass a range of at least 20-40 degrees (Col. 6, lines 54-57).93

11. With regard to claim 7, '182 as combined with '383 further discloses the downwardly extending separator wall ('182: 17 b & c) is located between the cyclonic gas flow ('383: Col. 1, lines 14-22; Col. 2, lines 43-48)) and the exhaust gas outlet (20a) (See Fig. 1A reproduced in part below).



12. With regard to claim 8, '182 further discloses the exhaust gas outlet (20a) formed in the ceiling of the main reactor (11).

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over '182 in view of '757 and '383 as applied to claim 1 above, and further in view of US 5,640,913 to Nyssonen.

14. '182 as combined with '757 fails to disclose an auxiliary chamber into which exhaust gas from the exhaust gas outlet is introduced; and another gas burner disposed with the auxiliary chamber to circulate and heat the exhaust gas in the auxiliary chamber. '913 teaches an auxiliary chamber (3) into which exhaust gas from an exhaust gas outlet (2) is introduced (Abstract); and another gas burner (7) disposed with the auxiliary chamber (3) to circulate and heat the exhaust gas in the auxiliary chamber (3) (Abstract). It would have been obvious for one skilled in the art at the time of invention to combine the plasma reactor of '182 as combined with '757 with the afterburning chamber of '913 because such a combination would have produced the added benefit of a further process to ensure all particulate matter and combustible materials in the exhaust gas are completely consumed prior to final treatment and release into the atmosphere.

### ***Conclusion***

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David J. Laux whose telephone number is (571) 270-7619. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on (571) 272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. J. L./  
Examiner, Art Unit 3743

June 5, 2009

/Kenneth B Rinehart/  
Supervisory Patent Examiner, Art Unit 3743